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features of this small shrubby group, restricted to the southwestern region of Cape Colony, are fairly before us. Three of the five genera were investigated (*Sarcocolla*, *Penaea*, and *Brachysiphon*), suitable material of the other two (*Endonema* and *Glischrocolla*) not being available.

The morphological characters of the three genera examined are the same, so that one account can serve for all. The megaspore mother cell produces four nuclei, usually tetrahedrally arranged, and these migrate to the periphery of the embryo sac, where each gives rise to a group of four nuclei. Three of the nuclei of each group are organized into cells which resemble an egg-apparatus, while the four remaining free nuclei fuse in the center of the sac to form the primary endosperm nucleus, which after fertilization forms a parietal layer of nuclei, walls appearing much later. The embryo has no suspensor, appearing first as a spherical mass of cells, which elongates as the tissues are differentiated and the growing points are organized.

This seems clearly an illustration of the formation of an embryo sac by the cooperation of four megaspores, in this case the product of each megaspore remaining remarkably distinct.—J. M. C.

**Embryo sac of *Pandanus*.**—A preliminary note<sup>22</sup> under this title has already been referred to in this journal.<sup>23</sup> The fuller account, with plates, has now been published.<sup>24</sup> *Pandanus* has long been regarded as a promising primitive monocotyledon, and its investigation is most timely. The general results are as follows: the archesporial cell (presumably solitary) cuts off a parietal cell which gives rise to several layers of cells separating the epidermis from the megaspore mother cell; the mother cell divides transversely into two daughter cells, the inner one of which directly produces the embryo sac, while the outer one divides anticlinally; the first division within the sac (the second reduction division) results in two polar nuclei; the micropylar nucleus divides, and there is no division of the daughter nuclei, nor is there usually any differentiation into egg and synergid; the antipodal nucleus gives rise to twelve nuclei, whether by simultaneous division or not was not determined; in the most advanced stages secured no nuclear fusion was observed, all fourteen nuclei remaining quite separate.

The author still maintains that the embryo sac of *Pandanus* is a more ancient type than the ordinary eight-nucleate sac of angiosperms, and that it represents a new type, "with its nearest analogue in *Peperomia*." It remains to investigate the fertilization stages of this interesting embryo sac, to determine whether the fourteen-nucleate condition really is the fertilization stage.—J. M. C.

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<sup>22</sup> CAMPBELL, D. H., The embryo sac of *Pandanus*. Preliminary note. *Annals of Botany* 22:330. 1908.

<sup>23</sup> BOT. GAZETTE 45:364. 1908.

<sup>24</sup> CAMPBELL, D. H., The embryo sac of *Pandanus*. *Bull. Torr. Bot. Club* 36:205-220. pls. 16, 17. 1909.